SIERRA CLUB BULLETIN.

VOL. V. SAN FRANCISCO, JUNE, 1905. NO. 4.

THE GRADE PROFILE IN ALPINE GLACIAL EROSION.*

BY WILLARD D. JOHNSON.

It was early asserted of the cañons of the Sierra Nevada that they are essentially the products of glacial erosion. A continuous glacier mass, or ice-cap, was supposed to have covered the summit region of the range, with individual glacier tongues channeling its flanks to the foothills, on the broad western flank descending close to sea-level. These cañons, except as to their lower and older parts, were described as U-troughs. There was no mention, however, of distinctive character in their longitudinal profiles.

My own acquaintance with the phenomena of Pleistocene glaciation of the alpine type had its beginning in the High Sierra, in 1883. At this later date prevailing opinion apparently leaned to quite the opposite view,—that glacial occupation, even here, had been relatively protective of the preglacial topography. It was shown that the earlier announcement had been without sufficient warrant. It appeared that glacier extension on the west had fallen notably short of the range-foot. There was

* Read at the International Congress of Arts and Science, St. Louis, Sept. 21, 1904. Reprinted, with changes by the author, from the *Journal of Geology*, October-November, 1904.

CIRQUE BOWL AND GLACIER.
Head-wall 1,000 feet above glacier in center of picture. Distance from wall to lake in foreground, three quarters of a mile.
From a photograph by N. H. Darton, U. S. Geological Survey.

a disposition to believe that preglacial forms, including the great cañons, had been merely swept clean of decay products and talus, and sound bed-rock smoothed and polished. Of the class of features to which I have to refer as anomalies of grade, only isolated, striking examples received attention; and these were given place in a catalogue of wonders, without attempt at correlation or explanatory description. In the general denial of quantitative efficiency in glacial erosion they were left unconsidered.

As a maker of topographic maps, I had the topographer's familiarity with the erosion aspects of mountains, though of unglaciated mountains only. By fortunate field association I had acquired as well something of the inquisitiveness of the physiographer as to the origin and development of topographic forms. Yet the scheme of degradation disclosed from the widely commanding summit of Mt. Lyell—the first station occupied in my work of survey in the High Sierra—was one for which I had in no way been prepared. In its dominant characters of ground-plan and grades it was unintelligible. Stream erosion was plainly to be excluded. It is no less clear to me now than upon that first comprehensive view from Lyell that the development of such characters by the agency of running water is theoretically impossible.

Most conspicuously in evidence were remnants of an old topography. These were tabular and high-walled, though on closer examination their seemingly flat surfaces proved to be variously graded. Of inconsiderable area, even collectively, they were none the less striking.*

* The Dana, Gibbs, and Koip crests, to the northeast of Mt. Lyell, are good examples. In the Bighorn Mountains, in Wyoming, they are larger and more connected.

ARC OF THE CIRQUE WALL EXCEEDING A SEMICIRCLE.

From lake-end at right, in foreground, to head-wall, one mile of continuous lake. Height of wall, 1,700 feet; of cliff at right, 1,200 feet.
From a photograph by N. H. Darton, U. S. Geological Survey.

They occurred as elements of the widely meandering divide, or of its principal spurs, and never as minor elevations in the basins thus inclosed. In their outlines, in plan, there was presented a pattern of innumerable cirques, as a rule intersecting, and of approximately equal radii though unequal lengths of arc. Often enough to suggest a tendency, this length of arc approached, or even a little exceeded, the half-circle. In such exceptional cases flat-topped arms of the upland on either side made gently graded descent, ending in rounded shoulders still overlooking the basins. These sharp outlines were suggestive of nothing so much as the scattered remnants of a sheet of dough on the biscuit-board, after the biscuit-tin has done its work. The cirque walls, obviously, were walls of sapping and recession. And in a measure, therefore, the greater arcs, thus scalloped in detail, inclosing the basins, were arcs of recession also.

The tables rarely occurred wide apart, but in clusters or short chains. The cirques also were noticeably clustered, alternately, on opposite sides of the divide, and the tabular survivals of the old surface were commonly confined to these sections of the divide, between its more pronounced meanders. Where the old surfaces were grouped, a broadly domed divide as a rule was traceable across them; but detached, they presented as many differently inclined single planes.

In the early development of bad-land forms out of a soft plain there is scalloping in plan, though in less clean arcs than the cirques exhibit. But one characteristic feature of the cirque, regarded as a hollow, had no analogue in these accepted type-forms of running-

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From lake-end at right, in foreground, to head-wall, one mile of continuous lake. Height of wall, 1,700 feet; of cliff at right, 1,200 feet.
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water erosion—on early and strong grades. The cirque hollow was a true amphitheater; its walls, or precipitous slopes, descended, not to a funnel-point, but to a floor, approximately level. And the breadth of the amphitheater on its floor commonly exceeded even the imposing measure of its depth.

The basins about which the cirques were ranged as alcoves, each contained a central draining cañon. In each, tributary cañons, starting at the cirques, converged toward this central cañon-head, rapidly shallowing and entering at high levels.* It is this point of drainage convergence in the basin which more properly corresponds, perhaps, to the funnel-point of the miniature bad-land form.

Within the basins,—that of the Tuolumne, which I had followed to Lyell, and others subsequently visited,—all surfaces were glaciated, exhibiting abundant polish, striæ, and moutonnée details. Only the crests, with their occasional tabular elements, were free from these evidences. Postulating glaciation, the serrate ridges and the high tables alone had been emergent from the Pleistocene ice; the basins had been "névé fields"; and the central cañons, channel troughs of glacial escape.

Migration of the divides by cirque-wall recession, with accompanying degradation of a thousand feet or more, was to be inferred; but, on the other hand, were the central cañons of the basins wholly preglacial, and merely cleared out?

The troughs at their heads were abruptly deep, often profoundly deep. To notable distances their floors, start-

* Such a cañon head, central to a meander arc of the divide, is developed in type form in the basin of the Merced, five miles southwest of Lyell.

A STEP IN THE GRADE PROFILE.

From a photograph by N. H. Darton, U. S. Geological Survey.

ing full width, were level, holding fiord lakes; or else, more commonly, they had been aggraded to ribbon meadows, on which their streams meandered. Figuratively, I characterized them as valleys down at the heel. But at points far apart compensation of grade was had in steps. Here the draining stream often dropped in a thin sheet, without notch of its own making, or spread in braided cascades. Appeal to rock structure as a determining factor in the development by running water of horizontal elements of such magnitude in the long profile would be futile. The rock of the basins about Mt. Lyell was granitic. Its only large structures were joints—if possible faulting might be disregarded. The joint systems were of all strikes and dips; and some were horizontal. But the preglacial streams responded to such controls in the same manner that present streams do; and the present streams were not at grade. At the foot of each step was an alluvial cone and a wash-plain. The streams were engaged in filling. But, obviously, in many instances, they had before them an immense task of grade adjustment; and the measure of that task was the measure only in part of the glacial degradation.

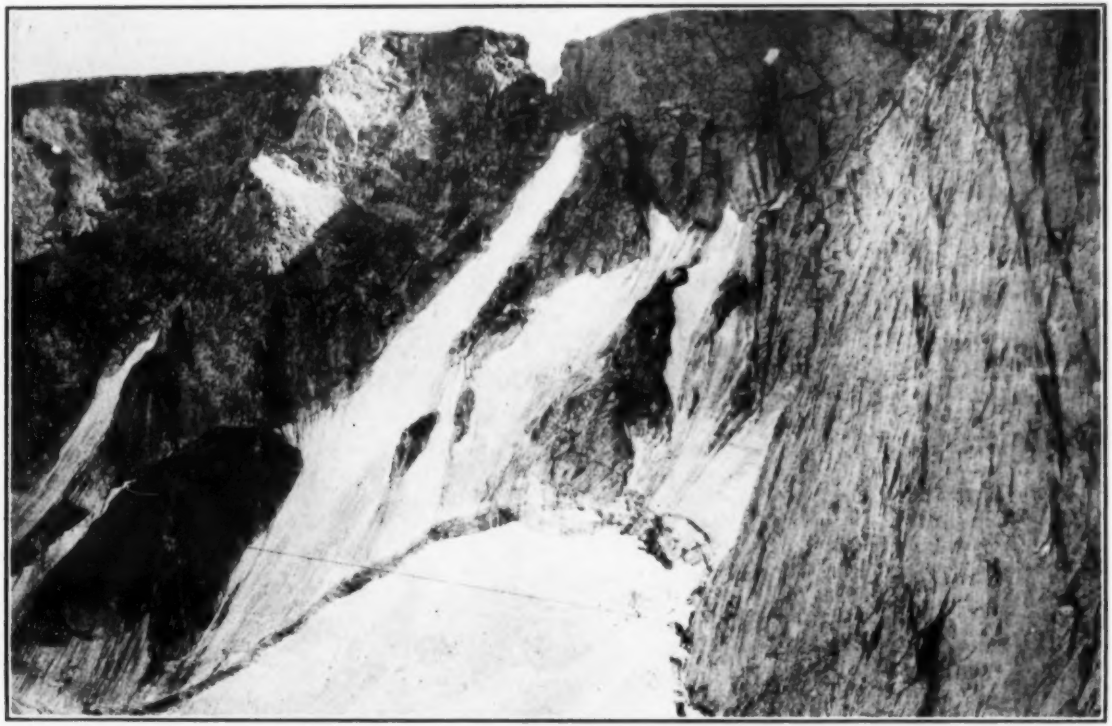
On the tread of the steps descending to the trough head, where the beginnings of post-glacial refilling were less appreciable, there was persistent occurrence of reversed grades. In such cases the long floor was ponded backward from the polished brink of a cross-cliff, or cascade descent. In the cirques frequently rock-basin lakes lay deep against the curving talus of the head-wall, visibly shallowing forward. There seemed to be revealed a tendency of the ice-stream vigorously to sink its valley at the head, where its feeding snows gather most deeply;

A STEP IN THE GRADE PROFILE.
From a photograph by N. H. Darton, U. S. Geological Survey.

and, as in specific instances the distribution of tributary streams suggested, to sink it again wherever the entrance of a tributary tended to deepen it locally. At least it was apparent that forward grade of bed is not essential to glacier motion.

Mt. Lyell in plan was a four-rayed star of thin arêtes. A small glacier occupied the cirque-basin, or amphitheater, facing northward; and three other amphitheaters, empty of ice, opened severally east and west and south. There was no vestige of an upland surface. It was hardly to be doubted, however, that a stage of plateau wasting had recently been closed here also, and the stage of sinking initiated. Elsewhere combs and spires associated with the tables, though invariably falling short of their high levels, were recognizable as evanescent final forms in the transition from a stream-modeled upland, mantled with residual gravel, to a relative lowland of glacial truncation displaying only sound, bare rock. The old surface had not been worn down; it had been cut away. Sapping and rude planation had been the process —in the summit area, back from the channel-trough heads. On that hypothesis the anomalous topography of wide floors and upright forms in great variety at once became interpretable. Its unit in plan was the geometrical figure of the cirque. And the glacier makes the cirque.

Among the schrunds of various systems sharply lining the Lyell glacier the great arc of the open "bergschrund," a little out upon the ice, closely paralleled the arc of the wall. It seemed possible that the bergschrund penetrated to the wall-foot, along the line of its floor, and that sapping there resulted from some special action to which this



THE BERGSCHRUND.

Height from schrund to flat upland, about 800 feet. Notch in skyline, point of inosculation with opposing cirque beyond, and beginning of thin arête.

From a photograph by N. H. Darton, U. S. Geological Survey.

exceptional opening gave rise. With the aid of all hands from camp, therefore, a descent and direct observation was undertaken. The schrund opened to the wall, and then continued, with rock on one side, for twenty or thirty feet deeper. The total depth was estimated to be one hundred and fifty feet. At bottom, the width between walls ranged from five to ten feet. The floor, so far as followed,—perhaps one hundred feet,—was approximately level, though made up of fallen masses of rock and ice. Observation was conducted with the aid of a sputtering candle, in a rain from the dripping walls. This water seemed to result from local melting; there was no stream entering at the surface. The rock of the wall face was much riven, though undecayed. Disrupted masses were in all stages of dislodgment. Some were to be seen incorporated in the glacier wall at its foot. Open seams in the rock-wall were partly filled with films or plates of ice, thinned by melting, and removable. Icicles of great size were abundant, and the rock fragments of the floor were ice-coated. To venture an inference from a single observation at a single point, the bergschrund foot is a line of frost-weathering, relatively vigorous, because freezing and thawing, there, alternate at short intervals, as compared with the annual intervals outside; and of quarrying, because the glacier acts as the efficient agent of removal. I have failed of opportunity to repeat and extend these early observations, and the hypothesis in explanation is slightly supported; but independently of explanation, the fact of sapping and recession in this summit region seems to be unmistakably attested by the sharply delimited plateaus, their connecting thin arêtes, and the rude platform from which they

rise. On the evidence of these same characters it is apparent no less that the process was rapid and its period short.

But head-wall sapping, with planation, is only one process. Scour is another; and scour acts vertically. The greater basins, doubtless preglacial in their outlines on the range flanks, have been expanded over the summit region, and the wide-open, shallow troughs there are essentially the products of glacial erosion, by head-wall recession; and they are the measure of that erosion only in part. The central cañons, on the other hand, as channel troughs of glaciation are doubtless preglacial as to their courses. And in their central parts they may have been deep. But in their upper parts, on the evidence of their grade profiles, they are to be regarded, in the main, as products of glacial erosion also.

The sensibly level elements in these profiles, their great length often, and the common occurrence of grade reversal in the more exposed floors above the trunk-cañon head, seem to imply that the glacier advances from the bottom, escaping from under its own weight; that its lines of flow gradually rise, seeking to equalize depth and load, because ablation planes away and thins the forward part; and that, correspondingly, along the bed, both pressure and velocity, and therefore erosive vigor, diminish.

EASTWARD FROM MT. CONNESS.

In the foreground is the upper edge of a small glacier with its head cliff and bergschrund. Farther away the descending continuation of the same cliff springs from a schrund line, the exact position of which is masked by a lingering snow-drift.

SYSTEMATIC ASYMMETRY OF CREST-LINES IN THE HIGH SIERRA OF CALIFORNIA.*

By G. K. Gilbert.

The substance of the present paper was communicated to the Section of Physiography of the Congress of Arts and Science at St. Louis last September. The section had just listened to Mr. Johnson's paper on "The Grade Profile in Alpine Glacial Erosion." Mr. Johnson stated that since his first observations in the Sierra in 1883 his ideas as to the explanation of the phenomena had undergone development, and he regretted that he had been unable to revisit the region for purposes of verification. It was therefore a matter of gratification that I was able to supplement his presentation by the statement that during two seasons of exploration in the glaciated district of the Sierra I had found his hypothesis of cirque development by glacial sapping of the utmost utility in the explanation of the topography. It happened also that its utility was illustrated in my discussion of the origin of the special features to which my own communication referred.

In the higher part of the Sierra Nevada the glacial cirque is a conspicuous feature of the topography. Each main crest of the great mountain mass, as a rule, is bordered on each side by a row of cirques facing outward. Separating the cirques on the same side of the main ridge are subordinate ridges or spurs. Gradually

* Reprinted from the *Journal of Geology*, Vol. XII, pp. 579-585.

the cirques unite to form glacial troughs, and these troughs are separated, at a somewhat lower level, by ridges constituting subordinate features of the range. Some of the ridges between cirques and between troughs are equally steep on both sides of their crest-lines, but many—a large minority—are notably steeper on one side than on the other, and this asymmetry of cross-profile is definitely related to the cardinal points. Ridges trending east and west are steeper on the north side than on the south, those trending north and south are steeper on the east side, and those trending northwest and southeast are steeper on the northeast side. In general, the gentler slope has the grade of a steep roof, and it is often clothed by rock fragments approximately *in situ*. Ordinarily it is too steep for the horse, but is readily scaled by the mountaineer. As a rule, the steeper slope either is constituted by, or else includes, an abrupt cliff which at most points cannot be climbed. Figure 1 of Plate XLI shows a group of high ridges in which the steeper faces are turned to the north, and Figure 2 a group in which they are turned to the northeast.

These slopes are not controlled by rock structure. The principal rock is granite, and this granite is in large part structureless. Where it is traversed by joint systems the details of sculpture are greatly influenced by the joints, but the trend and slope of the greater features are independent of the joints.

A little reflection shows that the distribution of steep slopes is correlated with the alimentation of Pleistocene glaciers. The southward slopes of the east-west ridges, because turned toward the sun, lost more snow by melting and evaporation than did the northward slopes, and a

FIG. 1.—EASTWARD FROM MT. GARDINER.

Compare the southward (right) slopes with the north-facing cliffs.

From a photograph by J. N. Le Conte.

FIG. 2.—SOUTHEASTWARD FROM ALTA MEADOWS.

Compare the northeast-facing walls of the high glaciated valleys with their southwest-facing walls.

smaller fraction of the snowfall they received remained to nourish glaciers. Thus the glaciers resting against the southward slopes were comparatively ill-fed, and the glaciers of the northward slopes were comparatively well-fed. The north-south ridges may be assumed to have been swept, then as now, by dominant westerly winds, which carried much snow from the westward slopes over the crests to the eastward slopes, where it accumulated; and thus the glaciers resting against the eastward slopes were better nourished than those of the westward. These peculiarities of snow distri˙ ıtion may be readily observed at the present time. If one stands, late in summer, upon a peak in the midst of the glaciated district and looks toward the east or north, he sees bare rock, with only here and there a small remnant of snow; but if he turns toward the west or south, he looks upon a patchwork of snow and rock in which the predominance of the rock may not at once be apparent. Figure 2 of Plate XLII illustrates the relations of surviving snow-banks in early summer to northward and southward slopes.

It can hardly be doubted that the distribution of Pleistocene snow deposition stands in causal relation with the distribution of asymmetry in the crest-lines of the minor ridges. And it is in explanation of this relation that I avail myself of Johnson's hypothesis. Each glacier which receives more snow on one side than on the other adjusts its cross-profile to a condition of equilibrium by moving away from the region of greater supply to the region of lesser supply. This lateral motion is of course combined with the general, and more rapid, forward motion of the glacier, but it is nevertheless competent to produce at the side of the glacier phenomena quite similar

to those at the head. Figure 1 shows diagrammatically the ground plan of a glacier flowing northward. The greatest snow accumulation is in the cirque, *AA*, where precipitation is at a maximum, where depletion through solar influences is at a minimum, and where circling cliffs protect against removal by the wind. There is great accumulation also along the west margin, *BB*, where the snow drifted by the westerly winds comes to rest in the shelter of the west wall of the glacier trough. Along the eastern border, *CC*, the snow deposit is comparatively small, because of exposure to the westerly winds. The resulting lines of ice-flow are as drawn. Moving directly away from the walls of the cirque, the glacier makes and annually renews the bergschrund *ab*. Moving obliquely away from the west wall of the trough, the glacier similarly produces the minor bergschrund *bc*, and this minor bergschrund leads to sapping and the production of a cliff, just as the major bergschrund causes the cirque cliff. Thus the west wall of the trough is kept steep, and is thereby contrasted not only with the east

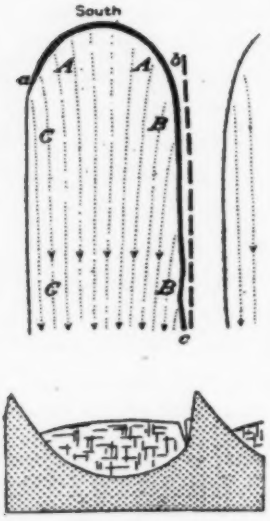


FIG. 1.—Diagrammatic ground plan and section of a glacier.

The heavy line *abc* marks the position of the bergschrund. Dotted lines show direction of ice flow. The broken line marks the crest of the spur separating the glacier from its neighbor on the west.

FIG. 1.—NEAR MT. McCLURE.

Spur between two glacial amphitheaters, showing schrund line.

FIG. 2.—WESTWARD FROM MT. HOFFMAN.

Compare the glacial topography of the north (right) face of ridge, with the nonglacial profiles toward the south.

From a photograph by A. C. Lawson.

wall of the same trough, but with the east wall of the adjacent trough, so that the rock crest between the two troughs is not symmetric.

Usually in viewing a cirque it is possible to trace about its wall a somewhat definite line separating a cliff or steeper slope above from a gentler, usually scalable, slope below. This line I conceive to mark the base of the bergschrund at a late stage in the excavation of the cirque basin. I have called it in my notes "the schrund line." It can usually be traced for some little distance beyond the cirque, and sometimes for several miles on one wall or other of the glacier trough. Advancing along the trough wall, it descends gradually with a slope which may be assumed to represent the gradient of the ice surface, that surface having been somewhat higher than the schrund line. Its expression outside a cirque may be seen in the lower figure of . late XLI and the upper figures of Plates XLII and XLIII.

At a somewhat lower level than that to which the preceding paragraphs apply, the Pleistocene glaciers occupied a smaller share of the surface, and there are considerable unglaciated areas. The photographs shown in Plate XLIII were made in this region. The upper view is westward up the trough of a glacier. Beyond the head of this trough is another glacier trough descending westward, and the dividing ridge was partly destroyed by the head-erosion of the glaciers, so that the typical amphitheater is not shown. The south wall of the trough is steep, and shows distinct evidence of sapping. The cliff at top, being composed of thoroughly jointed granite, does not stand vertical, and the fragments recently fallen from it have built a talus which conceals the schrund line.

But it is evident that here the sapping action at the schrund line was more active than the glacial erosion lower down on the slope, so as to create a sort of shoulder or terrace near that level. Stating the interpretation in another way, the excessive alimentation along the south wall of the glacier was here developing a branch glacier and a tributary cirque. This cirque was eating its way back into the ridge bounding the glacier. On the opposite side of the ridge, shown in the lower view, are gentle slopes, largely of preglacial origin, but there are also faintly developed cirques, from which small ice-streams flowed toward the south.

At still lower levels are many ridges along which Pleistocene glaciers were developed on one side only—the north or northeast side, so far as observed. The south and southwest slopes retain the preglacial facies, and retain also the actual preglacial topography, except for such equable reduction of surface as may have been accomplished by aqueous and atmospheric agencies. The direction of ice movement in such cases was not parallel to the ridge axis, but approximately normal to it. The glacial excavation did not always take the character of a series of cirques, but sometimes produced a continuous cliff, running with moderate undulation parallel to the ridge axis.

I have no photograph representing this topographic type in its purity. Figure 2 of Plate XLII, exhibiting a ridge of greater altitude, serves to show a somewhat similar cliff, wrought by glacial head-erosion, but imperfectly divided into cirques, and culminating in a crest from which nonglacial profiles descend in the opposite direction. But the example differs from the type in the

FIG. 1.—NORTH SIDE OF GOAT CREST.

The view is from Kid Peak, and looks westward along the crest.

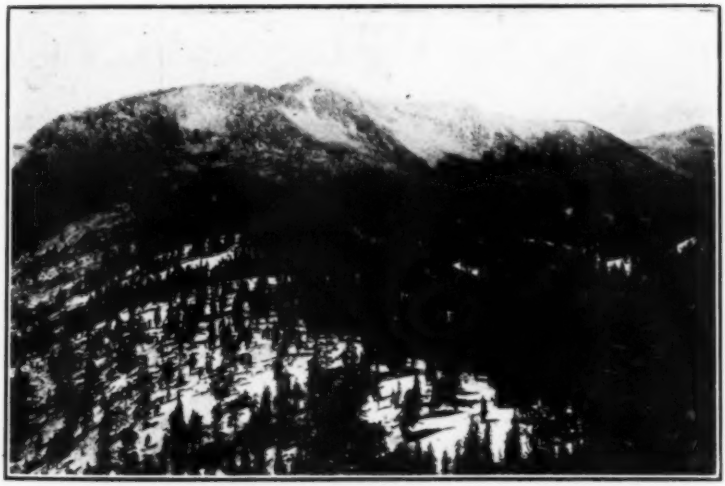


FIG. 2.—SOUTH SIDE OF GOAT CREST.

The view is from Buck Peak, and looks northeastward. Kid Peak is at the extreme right. The bare spots under the crest are shallow cirques.

stronger expression of the ice-work, in the comparatively high grade of the nonglacial profiles, and in the fact that those profiles, as seen in the photograph, conceal south-facing cirques of some magnitude.

The asymmetry of these lower ridges is more pronounced than that of any others, because instead of contrasting two phases of glacial erosion they contrast glacial with nonglacial. It is worthy of note also, though not strictly germane to my subject, that the contrast in sculpture of the two ridge slopes serves to compare the efficiency of subaërial degradation with that of one phase of glacial degradation. The glaciers of these low ridges, being able to develop only on the slopes most favorable for snow accumulation, marked the lower limit of névé conditions and were the feeblest of all the Sierra glaciers.

FIG. 2.—Diagrammatic cross-section of a ridge glaciated on one side only, with hypothetic profile (broken line) of preglacial surface.

Their lives must have been short, for they could exist only when glacial conditions were at or near a maximum; they began long after and ceased long before the glaciers of the higher districts. The topographic features they produced were subject to the dulling influence of atmospheric and aqueous attack during both interglacial and postglacial times. And yet the degradation they accomplished was far greater than that of nonglacial agents working on the opposite sides of the same ridges—agents working not only during the same time, but during all

interglacial epochs and during postglacial time. It is true that we cannot measure the nonglacial work, which consisted of a general reduction of surface without notable change of form; but whatever the amount, we may assume that it would have been the same on both slopes of the same ridge, had there been no glaciers. The visible ice-made hollows therefore represent the local excess of glacial over nonglacial degradation.

THE TUOLUMNE CAÑON.

By William Frederic Badè.

In the heart of the Sierra, more than eight thousand five hundred feet (about 2,616 meters) above the level of the Pacific, lies a truly alpine valley familiar to every mountaineer who has visited the regions north of Yosemite. It is vain now to regret the association of the word "meadows" with the romantic Indian name Tuolumne. The hunters and prospectors who valued a valley chiefly as an oasis for pack-animals were first at the christening and have succeeded in attaching the name of a common drudge to a queen of the Sierras. Many are the little rivers that know the way to this valley. They are mad little rivers, full of song and fury. Though often hidden in deep gorges, mostly carved through solid granite, they always are heard, now leaping a precipice with shouts of thunder, now singing the joys of a gentler career amid ferns and pines. All of them are true Jordans,—"descenders,"—but fortunately none of them, like the Kern, are found dead at the end. Long ago the valley was a famous hunting-ground of the Mono Indians, whose shapely obsidian arrows still dot the ground where in other days they bit the sod. Its upper end, where the Dana and Lyell Forks unite to form the Tuolumne, is an ideal camping-ground. Last summer the Sierra Club chose it a second time as its rendezvous and sent out thence its climbing parties to Dana, Lyell, and Ritter. These mountains, together

with Gibbs, Unicorn, Cathedral, and Conness, form the valley's nearer or remoter periphery, an imposing circle of snowy summits. In the valley, also, the snow lingers far into the summer, but a multitudinous procession of showy spring flowers is constantly treading on the edge of the snow-banks, pushing them up the pine-clad slopes to their last impregnable strongholds. Thence sally forth the six or seven glacier-born streams that join the Tuolumne in and below the Meadows. They make of it a turbulent river that even late in the summer would be dangerous, if not quite impossible, to ford on its foamy speedways.

Immediately below the Meadows the river plunges into a cañon that deserves to be counted among the greatest natural wonders on earth. For a long time it was considered impassable. In places the walls rise in almost vertical precipices to a height of more than five thousand feet. Though the cañon is scarcely more than thirty miles long, the fall of the river within that distance amounts to five thousand two hundred feet. It would be hard to imagine a wilder career for a river than that upon which the Tuolumne enters during this part of its course. Captain Clarence King, after a futile attempt to follow it through the cañon, is said to have pronounced such an undertaking impossible for any "creature without wings." But a few adventurous explorers have traversed it since then, and on the 20th of last July (1904) a party of fourteen men, organized by E. T. Parsons, started on a successful knapsack trip through the cañon. Fortunately all were picked mountaineers, inured to the wilds, for it proved a strenuous four days' trip full of adventure as well as indescribably

magnificent scenery. The writer found opportunity to make only a few general notes on the flora and fauna. Both are extremely interesting, and so rich and varied that it would require months to make anything like an exhaustive study of its animal life, to say nothing of the vegetation. The general trend of the cañon is a little north of west. This fact entails a great variety of light effects during the course of the day. The width of the cañon varies constantly, sometimes narrowing to little more than a hundred feet of churning water, sometimes widening to a quarter of a mile of forest and blooming meadow. It should be noted also that the course of the river is much more contorted than the geological survey map would lead one to suppose.

With provisions for four or five days in our knapsacks we left the main party at the Tuolumne Meadows and followed the south side of the river to the entrance of the cañon. The rough work began soon after we reached the point where Conness Creek enters from the north. Below the wonderful White Cascades, beside a magnificent trout-pool that furnished a palatable contribution to our menu, we ate our first luncheon. That afternoon we encountered earthquake taluses overgrown with extraordinarily dense thickets and made comparatively little headway. Opposite the entrance of Return Creek cañon the granite walls are very steep, with numerous abutments resembling giant towers in relief that lead the eye to dizzy altitudes. It was no doubt partially due to the extreme height of these stupendous cañon walls that we seemed unable to get past the entrance of Return Creek. At every turn of the narrow stream-bed the beetling parapets were still looming above

us. A never-to-be-forgotten night overtook our party on the edge of a series of magnificent, abruptly descending granite terraces over which the river plunged seven or eight hundred feet into unseen depths, a furious mass of roaring foam and spray. Under some daring pines at the edge of the precipice we built our camp-fires and cooked our evening meal. A few minutes' use of rod and reel again sufficed to add to our menu a delicious *entrée* of trout. Surroundings more abysmally grand it would have been hard to imagine. The sunset glow on the heights above, the witchery of the firelight on pines and rocks, the reverberating thunder of the river's batteries, the white glimmer of endless falls far down the cañon, the brilliance of the stars, the flutter and scream of wild creatures terrestrial and aerial, the far-flung shadows of lowering cliffs gliding through every gamut of form under the light of the rising moon—these and many other assets, in extraordinary measure, were among the features of that indescribable night. One can only imagine what re-enforcement the imagination of Dante might have gained from the contemplation of scenes like these. But it was not difficult to think of the somber bard treading the giant stairways in the footsteps of Virgil. Yet a voice of antiquity a hundred thousand times remoter than that of Dante or Virgil was speaking in the roar of water that rose from the gorge—the voice of the river grinding and chiseling still deeper the chasm at which it had labored for ages.

The writer is penning these words in one of the most picturesque* parts of the Old World, where at morn and eve

* The Upper Rhine.

ONE OF THE FALLS.

(Probably the Tuolumne Falls. See BULLETIN, Vol. I, p. 202.)

A SERIES OF CASCADES.

From photographs by the author.

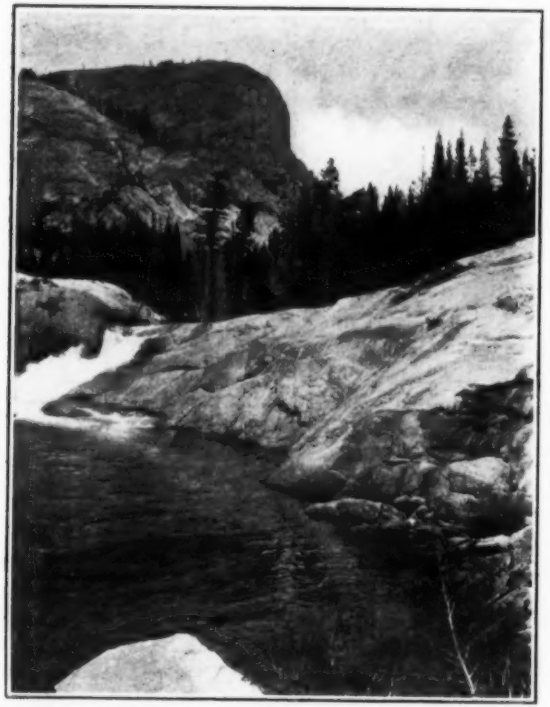
"The splendor falls on castle walls,
And snowy summits old in story."

But these skies, always overladen with moisture, do not furnish material for such gorgeous tapestries as the sun weaves at dawn and sunset on the crests of the Sierra Nevada. Nor have any ruins of the castled Rhine, perched never so loftily, appealed to my mind and imagination with the sublime grandeur of Tuolumne Castle. Perhaps these comparisons are too subjective. Let them serve merely to emphasize from another point of view the stupendous height and massiveness of the Tuolumne's rock fastnesses. Like those of the Grand Cañon of the Colorado, their appeal to the imagination is absolute without the legendary glory of dead robber barons. It is to be hoped that our Government will some time build a trail through this wonderland so that it may be made accessible to those who cannot heed the call of the wild when it leads through and over such obstacles as we encountered on our further progress through the cañon. These obstacles, while not formidable to a seasoned mountaineer, bar out every one who, besides experience in climbing, does not possess a large measure of health and endurance. What the character of the difficulties is has been sufficiently described by R. M. Price in a previous number of the SIERRA CLUB BULLETIN.* The writer, therefore, does not deem it necessary to traverse this ground again.

The second day we passed through what is probably the wildest and deepest part of the cañon. The river now had gone stark mad. One who has not seen the Tuolumne during this part of its course would hardly

* Vol. I., No. 6.

deem a river capable of such acrobatic feats, such headlong abandon. Its behavior is in large measure due to the unique character of the stream-bed, composed of smooth, polished granite, and often inclined at an angle of fifty-five degrees. With the friction reduced to a minimum, the water responds to the pull of gravity with an almost incredible momentum. Occasionally the stream in its descent dashes into a depression shaped like the bowl of a gigantic spoon, and on emerging soars heavenward in a majestic white column of spray. Here it resembles a great brilliantly white apron flapping in the breeze, there it is some foam-born goddess of the Sierran wilderness seeking to disengage herself from a thousand yards of filmy lace. In one place a number of smaller spoon-like depressions on the surface of a sharply inclined plane produce the effect of half a dozen beautiful ever-changing fountains that seem to shoot up through the swiftly gliding waters. The writer, with the approval of our party, would suggest the name "Fountain Cascade" for this unique phenomenon. In some of the longer cascades the speed of the water, occasioned by the conditions described above, leads to other spectacular phenomena rarely or never seen elsewhere. Thus it happens not infrequently that the flying current impinges against a giant boulder tossed into the channel by an earthquake, or against some well-buttressed ledge that successfully resists the impact of the river. The collision resembles nothing so much as an enormous explosion covered by a pall of misty smoke through which bombs of spray and fantastic water-wheels are hurled with titanic energy. Even the rainbows spanning the tumult in brilliant segments seem to break with every



COLONIES OF TREES HAVE ESTABLISHED THEMSELVES.

FOREST, CLIFFS, AND CASCADES.

From photographs by the author.

new shock of the rushing waters. The writer must confess to a great curiosity to see the river at such points in early spring, when it carries a double volume of water. The spectacle must be awe-inspiring in the extreme.

To those of us who thought the cañon more or less devoid of vegetation the experiences of these days brought much enlightenment. While in many places it is a deep boulder-choked gorge of bare granite, we found small forested areas throughout its course. Wherever erosion, glacial or post-glacial, has widened the floor of the cañon and permitted the accumulation of alluvium colonies of trees have established themselves. Many of these miniature forests are wondrously beautiful in their setting of lofty cliffs and snowy cascades. Most of them have remained untouched by fire. Straight tapering boles of mighty sugar and yellow pines reach far up into the noonday twilight that reigns under their feathery arches. In the upper reaches of the cañon the make-up of the tree societies is about the same as in Yosemite. The sugar pine, yellow pine, spruce, and incense cedar are the social magnates. Long stretches of the river's margin were found lined with dense hedges of azalea (*Azalea occidentalis*), whose magnificent bouquets of creamy, fragrant blossoms are a delight to the wayfarer and at least a partial compensation for the difficulties encountered in penetrating the thickets. The densest chaparral we encountered was a succession of azalea thickets in a part of the cañon known as Pate Valley. This is a very considerable expansion of the river gorge where Piute Creek enters from the north. In order to reach the river it was at times necessary to crawl through the thickets on hands and feet. The floor of the valley is

comparatively flat and covered for a mile or more with an almost pure growth of young incense cedar. Of the many exquisitely beautiful heathworts that flourish in the Sierra Nevada the cañon exhibits a richly varied assortment, and in the grottoes about the falls and among the giant boulders along the river's edge the bryologist doubtless would find an equally choice assortment of mosses and liverworts. We had to keep going so constantly that it was impossible to make any detailed observations.

There were plenty of fresh and well-trodden deer-paths. A number of herds must manage to make a prosperous living in the cañon. One morning early, in a dense thicket of incense cedar, the writer chanced upon a deer-yard—a place where for months they had been accustomed to gather and rest during the day. Two fine specimens were in possession. Evidently expecting some of their own kind, they tarried until they saw me emerging from the thicket, when they were off like arrows from the bow. It seemed only too evident in Pate Valley that would-be sportsmen, in spite of wardens and regulations, sometimes make murderous descents on them. During the night we spent in this valley, a bear, attracted no doubt by the smell of bacon, paid us a friendly visit. When, awakened by the breaking of twigs, two of us sat up, he departed with a precipitateness that left nothing to be desired. Undoubtedly this part of the cañon is a rendezvous also for bears and cougars. The evidences of their presence were never hard to find, although they themselves managed to keep out of sight, forewarned by our necessarily somewhat noisy progress through the cañon. Coyotes were neither

heard nor seen on this trip, but at Lake Tioga they made night hideous with their blood-freezing howls.

As might be expected, the cañon is a good breeding-place for rattlesnakes. We encountered a large number. Most of them seemed shy and disinclined to give warning until attacked. I secured one specimen, a diamond rattler, with eleven rattles and one button. This *Crotalus* was the only one that disputed the right of way with me.

On approaching the upper Hetch-Hetchy Valley, during the fourth day's climb, the vegetation of the cañon changed considerably. There was a large intermixture of scrubby oak, and open places frequently were covered with *Rhus*. We had descended from an altitude of eight thousand five hundred feet to an altitude of four thousand, and were entering upon the zone of foothill vegetation. The water of the river also had grown warmer and had lost something of its crystal clearness. Trout seemed to be less abundant and less inclined to take the fly. The river, checking the headlong momentum of its plunges over a thousand falls, began to loiter in immense pools that might have been taken for lakes. Enormous specimens of the California black oak, worthy of the traditions of Dodona, spread their shapely crowns against the horizon. On the sides of the cañon wherever taluses afforded a foothold, the goldcup oak in scattered groves reared its noble arches.

In the gloaming of the fourth day we reached the Hetch-Hetchy Valley and heard that the main party of the Sierra Club had just arrived and was encamping half a mile farther down the river, where we found a friendly reception that next morning. Relieved of

anxiety about provisions, we made another meal of what we had left and slept the sleep of exhaustion and contentment under a large oak that in all the long years of its life probably never spread its boughs over such a party.

Our clothing was mostly shreds, and our shoes, in not a few cases, had to be excused from further service. But we had conquered the cañon, hitherto traversed by only a few hardy explorers, and had brought with us a rich store of memories; for our thoughts will long revert to these days of climbing over rocks and earthquake taluses, past beetle-browed cliffs and spray-beaten precipices; to pictures of meadows, riotous with bloom and deeply set in granite frames; to starry nights in woodlands so beautiful that the wanderer longs to linger there and forget the great busy world so far away.

INSCRIPTION FOR THE LECONTE MEMORIAL

Dedicated July 3, 1904.

Here, traveler, pause upon thine upward way,
Enter and rest, and search thy soul to-day.
High are the mountains where thy feet would fare—
Let wisdom lead, that peace may bless thee there.

—Harriet Monroe.

KERN RIVER AND KAWEAH PEAKS, LOOKING SOUTH FROM HARRISON'S PASS, JULY 24, 1902.

From a photograph by Dr. J. H. Johnson.

KERN RIVER AND KAWEAH PEAKS, LOOKING SOUTH FROM HARRISON'S PASS, JULY 24, 1902.
From a photograph by Dr. J. H. Johnson.

OVER HARRISON'S PASS FROM THE NORTH WITH A PACK-TRAIN.

By Force Parker.

Harrison's Pass is about 13,000 feet in altitude—the highest pass in the United States. It opens north and south on the King's-Kern Divide,—that is, on the range separating the more beautiful valley of the King's River from the grander cañon of the Kern.

Were the trail passable in the true sense, the pass would be to mountain-lovers what the Panama Canal will be to commerce. It would save the long hot detour of many days over the Kearsarge Pass and the broiling sun of the Owen's Valley, or the other long roundabout trip by way of the Giant Forest, by which last route the traveler may have come into the mountains.

In July, 1902, Dr. J. H. Johnson and I had been camping for three days at Lake Reflection on the King's River side of the pass. We had been in the mountains for six weeks; provisions were running short, and we were anxious to get over into the Kern Valley on the way home. There were rumors that the Pass could be crossed with safety only on the snow, which becomes soft and treacherous in midsummer. But the Doctor was obdurate and I curious; so we decided to try the pass.

The pass must be about six or eight rocky, steep, and winding miles from Lake Reflection, and the way is an undefined and scattered sheep-trail, which we had to rebuild and repair as we went along. We had five horses,

and there were but two of us; so we were accordingly careful. The trail proper runs from East Lake, which is below Lake Reflection on the South Fork of Bubb's Creek; but instead of going back to East Lake, which is where the Mt. Brewer division of the Sierra Club established Camp Le Conte on the 1902 outing, we cut across the ridge, which is very steep and rocky and without sign of trail. We started shortly after sunrise, and getting into the cañon leading to the pass we worked our horses on up the mountain meadows and beside several beautiful small lakes. In one place we crossed boulders under which we could hear the water roaring and rumbling in the caverns beneath; but we could not reach it or even see it.

Finally, at 1:20 o'clock in the afternoon we stood on the snow-fields gazing up the shale slide leading to the gap of the Pass. It is called a pass; but, as has been said, it will be useful only when the Government has placed a derrick there.

We had intended to camp for the night at the last meadow below, but in our enthusiasm had passed it by mistake, and having come up a difficult and dangerous defile we resolved to push on rather than go back to the meadow. There is neither wood nor horse-feed at the foot of the Pass.

It was the middle of July and the middle of the day. The snow was soft and deep; and although we proceeded with great caution and made many tests of its sustaining power, several animals had floundered in the snow and we were compelled to unpack them and dig them out. This was all at the foot as we approached the shale slide leading to the Pass. At its very foot our best riding-

animal, a beautiful creature, went through the snow with her front feet at the edge of a snow-basin some six feet deep, and turning a three-quarters somersault came to a stop in its bottom with her feet in the air. Her body fitted the basin so tightly that although she beat the air with her feet and threw up clouds of snow in her struggles to get out it was of no avail. She was "hard a-ground." Whereupon one of us sat gently and caressingly upon her lovely head while the other shoveled in snow on one side of her body and out from under on the other until we rolled her over and on to her feet. This took time, for she resented the situation every time she regathered strength and opportunity to struggle. The snow basin had been caused, as is usual in such cases, by the heat of the sun on a large rock, which now lay at its bottom, like a huge ant-lion in its circular trap pit. On the sharp rock the good horse had cut her legs and back shamefully. In fact every horse's feet and legs were bleeding and they left a thin trail of blood on the snow.

After extricating the mare from the snow basin we began to cut a zigzag trail up the shale slide towards the gap of the Pass, some 1,000 feet * above us. The slide is so steep that the shale continually slips and slides as the snow and ice melt and rocks frequently roll down.

We would cut fifty or one hundred yards of trail at a time and then lead the horses up to our work. We had as working-tools a hand-pick and a spade. At one turn in the zigzag the shale went out from under a horse's feet and in the consequent plunging the entire pack and sad-

* Mr. Robert D. Pike, in his most accurate and excellent account of the trip over the Pass from the opposite side of the Divide, has modestly said: "A vertical distance of about 700 feet."

dle slid off and rolled and bumped down to the snow below.

We worked on through the afternoon. Then the sunlight failed and the stars came out. We were not half-way up the slide, although we had worked unceasingly since 1:20 P. M.,

About midnight the moon slid into the gap above, and we worked on surrounded by the pinnacles shining with added solemnity and grandeur in the moonlight. It was very cold by this time, and the shale, frozen by the trickling water from the everlasting snows above, held more firmly than it had during the day. It did not slide in small avalanches so frequently, and fewer rocks came down. The animals were so weary—they had had no rest, food, or water since morning—that they were perfectly tractable and quiet both in the shadows and the moonlight of the cañon. I doubt that we could have succeeded in taking them up during the day, but at night they would sleep standing, as we worked at the trail.

About one hundred yards from the top we struck quite solid rock on one side; on the other sheer cliff; in the center solid ice, which we simply could not work with our pick and spade. So we went at the rocks and occasionally turned up pieces the size of small trunks. We had removed all packs and propped them along the trail as we moved up. One pack had been placed under the nose of an old horse who was dozing peacefully in the moonlight, when a descending boulder, loosened in our trail-making, bounded accurately under his chin and carried away a kyack to the snow-field in the glimmering distance below. Hop-skip, down it went, the amphitheater announcing in echoes its downward journey and

SUMMIT OF HARRISON'S PASS, JULY 24, 1902.

From a photograph by Dr. J. H. Johnson.

the scattering of its contents of cans and kettles along the way.

In carrying and recarrying packages and provisions, and in leading horses we crossed Harrison's Pass many times that night.

The last portion of our climb was literally up a flight of stone stairs which we had cut out of the cliff's side. So we stripped the horses of saddles and bridles and of everything except light rope halters around their necks, and up the rocks they climbed each one giving a grunt of relief as the sweeping slope of the Kern Valley broke upon his vision.

It was 4:20 o'clock in the morning as the last horse hooked his fore feet over the last stone step. As we looked back over the vast waves of the snow-capped peaks to the north; the northern lights flashed across the sky their wondrously colored streamers. It seemed a celebration of our success.

But we soon turned to less awesome things and opened a can of tomatoes. We turned the horses loose. The Doctor started out afoot for the water and the wood in the valley below, leading his favorite horse. I watched them until they looked like some stray straddlebug crawling into the timber-line. Then on the top of the Pass, in its very curve, and among the perennial snows, I rolled into a blanket and into a dreamless slumber. The horses hung their heads or nibbled the sparse grass or searched for the snow rivulets.

I do not know how long I slept. I awaked with my eyes staring into an immeasurable abyss of blue without a speck in its infinite expanse, with the sensation that I was falling into it from a vast height; I gave one cry

that startled myself into full wakefulness and roused the echoes in the surrounding crags. I was lying on my back in the glowing sunlight looking up into the resplendent azure of the mountain sky and not into a shoreless sea far below me.

Los Angeles, Cal., August, 1904.

CALIFORNIA FORESTRY LAW.

[Enacted 1905.]

AN ACT TO PROVIDE FOR THE REGULATION OF FIRES ON, AND THE PROTECTION AND MANAGEMENT OF, PUBLIC AND PRIVATE FOREST LANDS WITHIN THE STATE OF CALIFORNIA, CREATING A STATE BOARD OF FORESTRY AND CERTAIN OFFICERS SUBORDINATE TO SAID BOARD, PRESCRIBING THE DUTIES OF SUCH OFFICERS, CREATING A FORESTRY FUND, AND APPROPRIATING THE MONEYS IN SAID FUND, AND DEFINING AND PROVIDING FOR THE PUNISHMENT OF CERTAIN OFFENSES FOR VIOLATIONS OF THE PROVISIONS OF THIS ACT, AND MAKING AN APPROPRIATION THEREFOR.

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. STATE BOARD OF FORESTRY.—There shall be a state board of forestry, consisting of the governor, secretary of state, attorney-general and state forester, which shall supervise all matters of state forest policy and management and convene upon the call of the governor or of its secretary.

SEC. 2. STATE FORESTER AND HIS DUTIES.—There shall be a state forester, who shall be a civil executive officer, and who shall be a technically trained forester, appointed by the governor to hold office at the pleasure of the appointing power; and whether any candidate for the position is a technically trained forester shall be determined by certificate from the secretary of the United States Department of Agriculture, or from the Department of Forestry of the State University after such department is established. He shall receive a salary of twenty-four hundred dollars per annum, and shall be authorized and empowered to appoint two assistant foresters, whose salaries shall not exceed twelve hundred dollars each per annum. He shall maintain headquarters at the state capitol in an office provided by the secretary of state, and shall be allowed necessary office and contingent expenses. He and his assistants shall be paid reasonable traveling and field expenses which may be incurred in the necessary performance of their official duties. He shall act

as secretary of the state board of forestry. He shall, under the supervision of the state board of forestry, execute all matters pertaining to forestry within the jurisdiction of the state; have charge of all fire wardens in the state, and direct and aid them in their duties; direct the protection and improvement of state parks and forests; collect data relative to forest destruction and conditions; take such action as is authorized by law to prevent and extinguish forest, brush, and grass fires; enforce all laws pertaining to forest and brush-covered land, and prosecute for any violation of such laws; coöperate with landowners, as described in section 4 of this act; and publish from time to time such information of forestry as he may deem wise. He shall prepare annually a report to the governor on the progress and condition of state forest work, and recommend therein plans for improving the state system of forest protection, management and replacement.

SEC. 3. SUPERVISION AND CARE OF STATE PARKS.—The California Redwood Park and the Mt. Hamilton tract, together with all moneys heretofore or hereafter appropriated for the purchase of land for or care of said parks, tracts and stations, shall be in charge of the state board of forestry, said board to take the place of and forthwith shall have all the powers and duties now possessed in accordance with law by persons or commissions with regard to the state parks, tracts of land, and forest stations mentioned in this act, and also any forest or brush land which may hereafter become state property, or be placed definitely in the care of the state; and it is hereby further enacted that, *if the government of the United States* or *any individual* or *corporation shall,* at *any time, donate* or *intrust to* the *state of California,* for state park or state forest reserve purposes, any tract or tracts of wholly or partially wooded land, *such tract or tracts of land shall be administered* at *the expense of the state,* as *provided by law.*

SEC. 4. COÖPERATIVE WORK.—The state forester shall, upon request and whenever he deems it essential to the best interests of the people and the state, coöperate with counties, towns, corporations and individuals in preparing plans for the protection, management and replacement of trees, woodlots and timber tracts, on consideration and under an agreement that the parties obtaining such assistance pay at least the field expenses of the men employed in preparing said plans.

SEC. 5. PUBLICATION OF LAWS AND NOTICES.—The state forester shall prepare and print for public distribution, an abstract of all the forest laws of California, together with such rules and

regulations in accord therewith as he may deem necessary, and shall annually print and distribute a list of all fire wardens with their addresses, all such matter to be published with the approval of the state board of forestry. He shall also furnish notices, printed in large letters on cloth, calling attention to the danger from forest fires and to forest fire and trespass laws and their penalties. Such notices shall be posted by the fire wardens in conspicuous places along every highway in brush and forest-covered country, at frequent intervals along streams and lakes frequented by tourists, hunters or fishermen, at established camping sites, and in every post-office in the forested region.

SEC. 6. FIRE DISTRICTS.—The state forester shall divide the state into such number of fire districts as shall be deemed by him most necessary to the efficiency of his work; and, furthermore, any county, or combination of less than four counties, shall be made a separate fire district, upon request of the county board or board of supervisors, in which case such special fire district shall pay the cost of maintaining its district fire warden.

SEC. 7. DUTIES OF ASSISTANT FORESTERS.—The duties of the assistant foresters shall be to devote their entire time to state forest interests according to rules and directions to be determined by the state forester, with the approval of the state board of forestry. They shall take prompt measures to prevent and extinguish forest fires; keep a record of the cause, extent and damage of all forest fires in their respective districts, and perform such other duties as the state forester may direct.

SEC. 8. VOLUNTARY FIRE WARDENS AND THEIR DUTIES.—The state forester shall appoint, in such number and localities as he deems wise, public-spirited citizens to act as voluntary fire wardens, who may receive payment for their services from the counties or from private sources. They shall promptly report all fires and take immediate and active steps toward their extinguishment, report any violation of the forest laws, assist in apprehending and convicting offenders, and perform such other duties as the state forester may direct. The supervisors and rangers on the federal forest reserve within the state, whenever they formally accept the duties and responsibilities of fire wardens, may be appointed as voluntary fire wardens, and shall have all the powers given to fire wardens by this act.

SEC. 9. POWERS AND REQUIREMENTS OF FIRE WARDENS.—The state forester and all fire wardens shall have the powers of peace officers to make arrests without warrant, for violation of any state or federal forest laws, and no fire warden shall be

liable to civil action for trespass committed in the discharge of his duties. Any fire warden who has information which would show with reasonable certainty that any person had violated any provision of such forest laws, shall immediately take action against the offender, either by using his own powers as a peace officer or by making complaint before the proper magistrate, or by information to the proper district attorney, and shall obtain all possible evidence pertaining thereto. Failure on the part of any *paid* fire warden to comply with the duties prescribed by this act shall be a misdemeanor, and punishable by a fine of not less than twenty dollars, nor more than two hundred and fifty dollars, or imprisonment for not less than ten days nor more than three months, or both such fine and imprisonment, and the state forester is hereby authorized to investigate and prosecute such violations.

SEC. 10. ASSISTANCE OF CITIZENS IN FIGHTING FIRES.—All fire wardens shall have authority to call upon able-bodied citizens between the ages of sixteen and fifty years, for assistance in putting out fires, and any such person who refuses to obey such summons, unless prevented by good and sufficient reasons, is guilty of a misdemeanor, and must be fined in a sum not less than fifteen dollars, nor more than fifty dollars, or imprisonment in the county jail of the county in which such conviction shall be had, not less than ten days, nor more than thirty days, or both such fine and imprisonment; *provided* that no citizen shall be called upon to fight fire a total of more than five days in any one year.

SEC. 11. FIRE PATROL.—In times and localities of particular fire danger the state forester may maintain a fire patrol through the fire wardens, at such places in brush or forest land as the public interest may require, the expense of such patrol to be paid by the county in which such patrol is maintained; and, furthermore, he may, upon written request by counties, corporations or individuals, maintain a fire patrol on their forest lands, *provided*, that the expense of said patrol be paid by the party or parties requesting same.

SEC. 12. DISTRICT ATTORNEYS TO PROSECUTE VIGOROUSLY.—Whenever an arrest shall have been made for violation of any provision of this act, or whenever any information of such violation shall have been lodged with him, the district attorney of the county in which the criminal act was committed must prosecute the offender or offenders with all diligence and energy. If any district attorney shall fail to comply with the provisions of this section he shall be guilty of a misdemeanor, and upon

conviction shall be fined not less than one hundred dollars nor more than one thousand dollars in the discretion of the court. Action against the district attorney shall be brought by the attorney-general in the name of the people of the state on the relation of the state forester. The penalties of this section shall apply to any magistrate, with proper authority, who refuses or neglects to cause the arrest and prosecution of any person or persons when complaint, under oath, of violation of any terms of this act has been lodged with him.

SEC. 13. DESTRUCTION OF WARNING NOTICES.—Any person who shall destroy, deface, remove or disfigure any sign, poster or warning notice posted under the provisions of this act shall be guilty of a misdemeanor and punishable, upon conviction, by a fine of not less than fifteen dollars nor more than one hundred dollars, or imprisonment in the county jail for a period of not less than ten days nor more than three months, or both such fine and imprisonment.

SEC. 14. WILLFULLY, MALICIOUSLY AND NEGLIGENTLY SETTING FOREST FIRES.—Every person, who willfully, maliciously or negligently sets on fire or causes or procures to be set on fire any woods, brush, prairies, grass, grain or stubble on any lands not his own, or allows the fire to escape from his own land, whereby any property of another is injured or destroyed, or accidentally sets any such fire or allows it to escape from his control without extinguishing it or using every effort to extinguish it, shall be guilty of a misdemeanor, and upon conviction is punishable by a fine of not less than fifty dollars, nor more than one thousand dollars, or imprisonment for not less than thirty days nor more than one year, or both such fine and imprisonment. Setting such fires or allowing them to escape shall be prima facie proof of willfulness, malice or neglect under this section, *provided*, that nothing herein contained shall apply to a person who, in good faith, sets a back-fire to check a fire already burning.

SEC. 15. EXTINGUISHMENT OF CAMP FIRES.—Every person who, upon departing from a camp or camping place, leaves fire burning or unextinguished, or who after building such fire allows it to spread, shall be guilty of a misdemeanor and punishable by a fine of not less than fifty dollars nor more than five hundred dollars, with costs of suit and collection, one half of such fine, or such a portion thereof as shall not exceed fifty dollars, to be paid to the person securing the arrest and conviction of such offender, and if the defendant refuses or neglects to pay the fine and costs imposed, he shall be confined in the county jail of the county in which the conviction shall be had, for a period not to exceed

one day for every two dollars of the fine imposed, or may be subject to both such fine and imprisonment.

SEC. 16. RESTRICTION OF USE OF FIRE IN DRY SEASON.—It shall be unlawful during what is locally known as the "dry season," this to be considered as the period between May fifteenth and the first soaking rains of autumn or winter, for any person or persons to burn brush, stumps, logs, fallen timber, fallows, grass or forest-covered land, or blast wood with dynamite, powder or other explosives, or set off fireworks of any kind in forest or brush-covered land, either their own or the property of another, without written permission of and under the direction or supervision of a fire warden in that district; these restrictions not to apply to the ordinary use of fire or blasts in logging redwood, nor in cases where back-fires are set in good faith to stop an existing fire. Violation of these provisions shall be a misdemeanor, punishable, upon conviction, by a fine of not less than fifty dollars, nor more than one thousand dollars, or imprisonment not less than thirty days nor more than one year, or both such fine and imprisonment.

SEC. 17. ENGINES IN FOREST LAND.—Logging locomotives, donkey or threshing engines, and other engines and boilers operated in, through or near forests, brush or grass land, which do not burn oil as fuel, shall be provided with appliances to prevent the escape of fire and sparks from the smokestacks thereof, and with devices to prevent the escape of fire from ash pans and fire boxes. Failure to comply with these requirements shall be a misdemeanor, punishable, upon conviction, by a fine of not less than one hundred dollars nor more than five hundred dollars, and any person violating any provision of this section shall be liable to a penalty of not less than fifty dollars nor more than one hundred dollars, for every such violation, or imprisonment for not less than thirty days nor more than three months, or both such fine and imprisonment.

SEC. 18. CIVIL LIABILITY FOR FOREST FIRES.—In addition to the penalties provided in sections 14, 15, 16 and 17 of this act, the United States, state, county, or private owners, whose property is injured or destroyed by such fires, may recover, in a civil action, double the amount of damages suffered if the fires occurred through willfulness, malice or negligence; but if such fires were caused or escaped accidentally or unavoidably, civil action shall lie only for the actual damage sustained as determined by the value of the property injured or destroyed, and the detriment to the land and vegetation thereof. The presumption of willfulness, malice or neglect shall be overcome, *provided*

that the precautions set forth in section 17 are observed; *or, provided,* under section 16, fires are set during the "dry season" with written permission of and under the direction of the district fire warden. Persons or corporations causing fires by violations of sections 14, 15, 16 and 17 of this act shall be liable to the state or county in action for debt, to the full amount of all expenses incurred by the state or county in fighting such fires.

SEC. 19. CLEARING ALONG COUNTY ROADS AND LAND AFTER LUMBERING.—Counties, along the county roads, in forest or brush land, shall, when so directed by the state forester, and in a manner and to an extent prescribed by him, cut and remove all brush, grass and inflammable material from their rights of way. If such clearing is not done within a reasonable time after notice, said time to be fixed by the state forester, the state forester shall have it done and the county shall be liable to the state in an action for debt to the amount of the expense thus incurred, and in addition thereto for the expense of any fire patrol rendered necessary by such delay. It is *provided, further,* that all lumber companies, corporations, or individuals shall, when so instructed by the state board of forestry, and at a time and in a manner prescribed by said board, carefully burn their slashings, by which is meant the tops, limbs, and general débris left after lumbering.

SEC. 20. DISPOSALS OF MONEYS RECEIVED AS PENALTIES.—All moneys received as penalties for violations of the provisions of this act, less the cost of collection, and not otherwise provided for, shall be paid into the state treasury to the credit of the forestry fund, which fund is hereby created, and the moneys therein are hereby appropriated for purposes of forest protection, management and replacement under direction of the state board of forestry.

SEC. 21. MONEYS FOR FOREST PURPOSES.—County boards of supervisors may appropriate money for purposes of forest protection, improvement and management.

SEC. 22. PAYMENT OF EXPENSES UNDER THIS ACT.—There is hereby appropriated for the fifty-seventh and fifty-eighth fiscal years, the sum of seventeen thousand six hundred dollars ($17,600.00) for carrying out the provisions of this act, and for the payment of all salaries and expenses herein provided for.

SEC. 23. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

SIERRA CLUB BULLETIN.

PUBLISHED IN JANUARY AND JUNE OF EACH YEAR.

Published for Members. Annual Dues, $3.00.

The purposes of the Club are:—"To explore, enjoy, and render accessible the mountain regions of the Pacific Coast; to publish authentic information concerning them; to enlist the support and co-operation of the people and the Government in preserving the forests and other natural features of the Sierra Nevada Mountains."

ORGANIZATION FOR THE YEAR 1905-1906.

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Librarian — Miss ANITA GOMPERTZ.

REPORTS.

REPORT OF THE SECRETARY,

FROM MAY 7, 1904, TO MAY 6, 1905.

The Club has just completed one of the most prosperous and encouraging years of its existence, and has been engaged in some of the most active and effective work since its organization. The act of the last State Legislature receding Yosemite Valley to the National Government was accomplished largely through the efforts of the Club, which also aided in the adoption of the State Forestry Law, in securing the appropriation to be used for continuing the water and forest investigations in conjunction with the Federal Government, and in the transfer of the management of the Federal Forest Reserves to the Bureau of Forestry.

The additions to the membership during the year were one hundred and ninety-two, while ninety-eight names were dropped from the list by reason of death, resignation, or non-payment of dues, making a net increase of ninety-four members for the year. The membership of the Club numbered eight hundred and fifty-eight at the close of the Club fiscal year, and by the end of the next year, if the present members will only exert themselves to interest desirable persons in joining the Club, we ought to have one thousand members.

At the recent Club election, the Board of Directors named on the preceding page were elected, and at their first meeting they in turn named the officers there set forth.

The revised by-laws were adopted without a dissenting vote.

The Club prepared a very attractive exhibit in co-operation with the Pacific Coast Forest, Fish, and Game Association at the Mechanics' Pavilion in San Francisco during April, and was awarded the second prize—a handsome silver cup with horn handles. Great praise is due Mr. M. H. McAllister, without whose able assistance the Club exhibit would not have been possible.

The Le Conte Memorial Lodge Library in Yosemite Valley has been opened for the season, and Mr. H. A. Stout, a recent graduate of the University of California, who is in every way

qualified to represent the Club, has been secured to act as caretaker. A friend of the Club has presented twenty-five dollars to be used for the lodge, and a very fine photograph of Professor Joseph Le Conte has been purchased (with a portion of the sum) and appropriately framed for hanging in the lodge.

A large subscription to the lodge fund came from Professor Le Conte's students in South Africa after the lodge had been entirely paid for, and the committee having the matter in charge decided to use this money in securing a bronze tablet, with a bust of Professor Le Conte in bas-relief. Douglas Tilden, the eminent sculptor, is now engaged in modeling this tablet, which, when completed, will be placed in the lodge over the granite fire-place.

Mr. Harrington Putnam, of New York, has presented the following valuable volumes to the club library:—

Conway, Crossing Spitzbergen;
Fillipi, Ascent of Mt. St. Elias by Duke of Abruzzi;
Gribble, Early Mountaineers;
Weston, Japanese Alps;
Edwards, Ramble in the Dolomites;
Saussure, Voyages dans les Alpes.

Mr. Putnam has heretofore presented the Club with some of the finest books in its library.

Mr. Seaver and Mr. DuVal, of New York, have sent Tyndall's "Hours of Exercise in the Alps," and "The Playground of Europe," by Stephens.

Mr. Asahel Curtis, of Seattle, has given the Club a splendid photograph of Mt. Rainier; Mr. E. T. Parsons, several fine ones of Mt. Baker; and Dr. T. J. Patterson, of Visalia, a striking enlargement entitled "A Storm in the Sierras," all of which have been appropriately framed and hung in the clubroom.

The local walks have been resumed this spring and have proven very enjoyable. On May 13th and 14th, thirty-seven persons made a delightful excursion to Mt. St. Helena.

This year's Outing to Mt. Rainier and Paradise Park will be the first club outing to be taken at such a distance, but all indications point to an unqualified success. A large party of Appalachians from Boston and New York will join us, adding to the pleasure of the trip.

Very respectfully,

WM. E. COLBY,
Secretary of Sierra Club.

REPORT OF THE TREASURER.

SAN FRANCISCO, May 15, 1905.

TO THE DIRECTORS OF THE SIERRA CLUB.

Gentlemen—I hereby submit the following report of the finances of the Sierra Club during the year beginning May 10, 1904, and ending May 9, 1905:—

RECEIPTS.

(From Wm. E. Colby, Secretary.)

From dues 1904-1905	$2,120 00
From advertisements in BULLETINS Nos. 31 and 32	725 00
From rent of desk room in No. 316 Mills Building	72 50
From refund from Appalachian Club for postage	125 38
From sale of publications	6 25
Total receipts from Secretary	$3,049 13
Balance on hand May 10, 1904	580 20
	$3,629 33

EXPENDITURES.

Publications and advertising expenses	$1,190 89
Rent of Room No. 316, Mills Building	300 00
Distributing BULLETINS and letters	289 65
Printing circulars, stamps, and stationery	288 42
Expended on Le Conte Memorial Lodge	243 11
Clerical services	180 00
Typewriting	104 80
On account of Yosemite recession business	55 80
Public meetings	28 75
Furnishing office in Mills Building	13 25
Advertising Sunday walks	9 30
Exchange on checks	4 20
Sundries	14 07
	$2,722 24
Balance on hand May 9, 1905	907 09
	$3,629 33

There is on deposit in the Permanent Fund in the Security Savings Bank of San Francisco $100.00.

Very respectfully,

JOSEPH N. LE CONTE, *Treasurer.*

NOTES AND CORRESPONDENCE.

In addition to longer articles suitable for the body of the magazine, the editor would be glad to receive brief memoranda of all noteworthy trips or explorations, together with brief comment and suggestion on any topics of general interest to the Club. Descriptive or narrative articles, or notes concerning the animals, birds, forests, trails, geology, botany, etc., of the mountains, will be acceptable.

The office of the Sierra Club is at Room 316, Third Floor, Mills Building, San Francisco, where all the maps, photographs, and other records of the Club are kept, and where members are welcome at any time.

The Club would like to purchase additional copies of those numbers of the SIERRA CLUB BULLETIN *which are noted on the back of the cover of this number as being out of print, and we hope any member having extra copies will send them to the Secretary.*

MOUNT WEATHER, VIA BLUEMONT, VA., March 17, 1905.

DEAR MR. COLBY:

I thank you and the Sierra Club most deeply for your kind invitation to the Fifth Annual Outing. I should be most happy if I could be with you. I love the mountain-tops. But my duties are all in the opposite direction this year. Perhaps I may be able to join you next year. I hope to.

"Mount Weather" is but 6,800 feet above sea-level. Still even that is a useful elevation to the meteorologist. Why cannot the Sierra Club raise the funds for a station on the summit of Shasta or Rainier, as the Sonnenblick Club has done for the Sonnenblick in Austria? That would be a "lighthouse in the skies" for American meteorology. With best regards to Professors McAdie, Le Conte, Davidson, and other good friends,

Yours truly, CLEVELAND ABBE.

FROM TUOLUMNE MEADOWS TO YOSEMITE VALLEY BY TUOLUMNE PASS.

The United States Topographical Sheet shows a trail from Tuolumne Meadows up Rafferty's Creek to and across Tuolumne Pass and down the McClure Fork to the Merced River.

The region through which this trail leads is in the High Sierra amongst the head-waters of the Merced River. It is so interesting and so little visited that my companion and I desire to call the attention of the members of the Sierra Club to its accessibility. The two days of last summer in making this trip were two of the most interesting days that I have passed anywhere in the mountains. We thought that the route was known only to the sheep-herders and to Government surveyors, and

were quite prepared to send an elaborate article to the BULLETIN. But an examination of our file shows that the ground and much more has been covered in the following articles: "New Routes within Yosemite National Park," by N. F. McClure, Vol. I SIERRA CLUB BULLETIN, page 333; also, "A Route up Merced River," by Robert M. Price, Vol. II SIERRA CLUB BULLETIN, page 197.

The itinerary, therefore, will be briefly outlined in the hope that it will induce others to follow. We left the Club's camp in Tuolumne Meadows and turned up Rafferty's Creek, which comes into the Lyell Fork of the Tuolumne from the south. Rafferty's heads just below Tuolumne Pass. The trail keeps on the right-hand side and near enough the abrupt sides to follow the main stream.

We kept too much to the west, and found ourselves much too high up near Rafferty's Peak, and had to work our way below the crest of the ridge and down to the Pass, which was easily recognized as being the lowest point. Immediately over it were the interesting granite basins draining into Emeric Creek, and thence into the McClure Fork. Here at the Pass we nooned.

From the Pass, instead of following down Emeric Creek, the trail bears off to the east and climbs higher between Vogelsang Peak on the south and Vogelsang Lake on the north, until it comes to the edge of the basin of the McClure Fork. Animals would have had to be taken further to the east, following the monuments on the rock (the friendly "ducks," as my companion dubbed them) to where the descent was possible. As we were without animals, we worked our way down the cliff along a narrow watercourse and came out in the broad meadows below the head-waters of the McClure Fork of the Merced.

Here we should have camped in order to have thoroughly enjoyed the wonderful panoramas about us. Mt. Florence and Mt. McClure were right beyond us to the east, and high peaks and precipitous walls were all about. The afternoon was full of exhilaration, and continuously the panorama changed as we walked rapidly along the well-blazed trail above the McClure Fork. As the afternoon wore on we crossed the waters coming down from the Mt. Florence watershed; and we saw the wonderful dome standing by the side of the beautiful cascade by which Emeric Creek comes in, and understood why the trail did not follow that creek. From high up we saw Lake Merced, and on beyond the unmistakable Le Conte Dome, and on beyond the setting sun.

Our camp was made at dark on the Merced River. Early the next morning we skirted the north shore of Lake Merced to its outlet, and followed the river into Lost Valley and to where the Merced goes into the gorge of Little Yosemite. Further progress by the river seemed impossible, and we worked back and up over to the top of the north wall and had magnificent views of the domes and glaciated walls of Little Yosemite and back over the region whence we had come.

Then followed a climb of a hundred feet or more, and, keeping along the same elevation, through the forest to Sunrise Trail, and thence into Yosemite Valley.

All of this is easily possible for animals, except between the outlet of Lake Merced and Lost Valley. Along this stretch much care must be used. The route gives a glimpse of the wonderful region to the east. Before taking the trip, however, read the articles cited above, and then you will not content yourself with less than two weeks instead of two days.

ELLIOTT MCALLISTER.

RENO, NEV., March 18, 1905.

PROFESSOR ALEXANDER MCADIE, SAN FRANCISCO.

Dear Sir—Mr. Marsh and I spent eight days on Mt. Whitney, and climbed to the altitude of 13,250 feet, where we could look down on Langley's Lake. At this point the ledge was piled full of drifting snow with a treacherous crust beneath. I now believe that we could have succeeded in crossing this, although the risk would have been great.

The ascent to 13,500 feet could be made at any season of the year, I believe, especially if two or three cabins were constructed along the trail for refuge in case of storm. Access could be had to the summit also during most of the year, Mr. Marsh believes, if a narrow trail for man were cut higher up the pinnacles, where the drift-snow could not lodge in sufficient quantity to prevent the observer from keeping the trail open. The expense would not exceed one hundred and fifty dollars.

The weather was mild, though snow clouds hung over the mountains. The temperature did not fall below 10° F. The wind blew almost constantly from the east, from the subtropical Owen's Valley, and seemed to have an appreciable effect upon the temperature of the mountain, for Lone Pine Lake (9,800 ft.) and Mirror Lake at timber-line (10,450 ft.) were only partially frozen over, while the lakes west of Mt. Whitney at apparently similar altitudes were frozen completely over and

covered with snow. The snow also was mealy and unstable, with little hardness anywhere such as I have always found on Mt. Rose above the altitude of 8,500 feet.

As regards the difficulty of the ascent in winter, I should consider Mt. Shasta as not only far easier but also entirely safe, save for the possible fusillade of rocks below the Red Cliffs. There is no horse-trail up Mt. Shasta, however, above the altitude of 9,000 feet.

I wish I were free to do so; I should then venture to volunteer to take observations on Mt. Whitney for you for a year.

If you are willing, I will take the readings of a maximum and a minimum thermometer on Mt. Rose (10,860 ft.), north of Lake Tahoe, nearly every month during the coming twelve months, if you will send me the instruments. The results might have some value. Mt. Rose is the highest point east of the summits of the Sierras and north of Lake Tahoe. The wind is usually very high there; but Lake Tahoe may have an influence on the temperature. If you are favorable, I could place the thermometers on Mt. Rose at once. The temperature early in February at 6,500 feet altitude on this mountain fell considerably below zero, to judge from the frost crystals in my sleeping-bag and frosted feet and from the temperature of — 15° and — 25° F. at Truckee and Floriston the same night.

Our party had the honor of naming the peak directly south of Lone Pine Pass Mt. McAdie, to commemorate your services in advancing the science of climatology. Its altitude is at least 13,500 feet. If, as Mr. Marsh declares, this peak has not previously been named, we beg that you allow this name to stand.

Very truly yours,

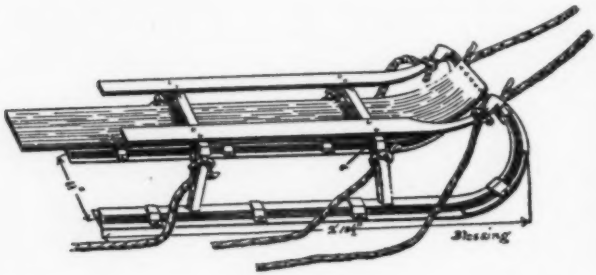
(Signed) J. E. Church, Jr.

Some enterprising and able California and Stanford students, among whom the Sierra Club is represented, have joined in the "University Transportation Company," with headquarters at 653 Market Street, San Francisco, and have undertaken to make the magnificent Hetch-Hetchy Valley accessible from June 1st to the end of August this summer. They are to be commended for their enterprise in opening this beautiful but hitherto little known region, and may be relied on to carry out their agreements. See our advertising columns for details.

SOME FURTHER EXPERIMENTS WITH SLEEPING-BAG AND SLED ON WINTER TRIPS.

After three more ventures under all the evil conditions that the devotee of long winter trips would believe that nature could feasibly prepare for him, I gladly avail myself of the present opportunity to supplement my earlier observations made on the subject of winter trips in previous issues of the BULLETIN.

The first requisite is snow-shoes, and after continued experimenting I have been unable to obtain any shoe superior to the "Algäne Schnee-Reifen," Form a, described in volume IV of the BULLETIN, page 64 (January, 1902), for trips requiring both sledging and the traversing of steep incrusted slopes. In newly fallen snow they are too small. But after the gruelling process of treading the feathery snow was over and a treacherous sur-



face had to be traversed, they immediately regained their reputation as equal both to the ice-ax and rock moccasin combined.

If possible, the elliptical shoe mentioned in the same article should be taken for use where the snow is not sufficiently packed or incrusted to bear one's weight without sinking more than four inches. When it is considered that one must be a draught-animal on such trips, the uselessness of the ski is at once apparent.

The home-made sled that had been used on our "New-Year Outing in the Sierra" (BULLETIN, Vol. IV, p. 216), had been found altogether too heavy. I purchased a child's sled with bent legs, for one dollar, and by making two simple changes, shown in the above cut, adapted it to the work in hand. Galvanized-iron runners two and one half inches wide were riveted on. At the bend of the runner the iron was doubled to withstand battering. The bed also was removed and a strip of ash board,

torn from a dry-goods box, was nailed below the bows to serve as a third runner in case of encountering soft snow.

The legs were wired at the bow *a* to the end of the cross-pieces to strengthen the frame of the sled. This sled was thus fitted to run astride of any low obstruction, which a toboggan would not do, and at the same time to retain the qualities of a toboggan if extra carrying surface should be required. It would be inadvisable, however, to attempt sledging in very soft snow except in an emergency.

Two defects were soon developed. The runners were too short and the sled was too narrow. Such sleds should be rebuilt so as to be four inches longer, if possible, and spring-steel bars should be substituted for the present ones of wood, of such size as to make the sled three inches wider between runners and two inches lower from the ground. The metal shoes should also be increased to the width of three inches.

My sled, even without these improvements, served its purpose well. It held as heavy a load as I could carry in two packs, passed through sagebrush beautifully, and could be hung up in a tree, with pack tied securely in place out of the way of any prowling wolf or cat. It would not and could not naturally stand upright on a slope so steep as to require a zigzag trail to surmount it, as we found on the sides of the cañon of Lone Pine Creek at Mt. Whitney. On the more gradual descents we rode astride on the load; on the steeper descents they rode on their own loads, with runners in the air, or spun side over side or end over end, while we clung to the rope. They also followed readily through the jungle,—that is, as readily as we could crowd a way through the yielding brush.

On the trip to Martis Valley between Truckee and Lake Tahoe, one other weakness was developed, but the snow was then at its worst. It had newly fallen after a heavy rain of long duration, and overlay a stratum of water which froze persistently to the cold metal of the runners, so reducing the sliding power of the sled that I was obliged to drag it down hill as well as up.

The sleeping-bag was successful from the start. It consisted of a large rabbit blanket inside a light duck case. Under the blanket was a light rubber sheet to re-enforce the duck. In the foot of the bag I placed a feather pillow, with a large packet inside to contain my feet. This idea was inspired by frostbite from sleeping out in zero weather with felt boots and rubbers, which probably had grown damp during the day.

A tent is also sometimes advisable. A McCall tent, listed

at $7.50, will serve the purpose admirably. Its weight is twelve pounds; its general size and shape can best be represented by the cut below. Marsh and I slept in one at timber-line (10,450 ft.) on Mt. Whitney for three nights. When it stormed during the day, we turned it upside down with all the parts spread out

as a canopy. A lighter tent should be made, after the same design, of silk for the sides and some light waterproof duck for the floor.

If a rainfall is out of the question, a light cotton sheet apexed over the head of the sleeping-bag as a breathing-hood would be quite sufficient for comfort. The sled, if stood on end, would form a ready support.

But the key to our success on Mt. Whitney was our hip-leggings of light rubber sheeting, made on the sewing-machine. The seams should be placed on the outside of the leg, where the water from the melting snow will not so readily find its way through the needle-holes. These leggings should, of course, be supplemented by felt boots and two-buckle rubbers to hold the bottom of the leggings firmly. Had we not by the merest good luck provided ourselves with these, the water-soaked snow would have wet us so thoroughly the first day that we would have been compelled to beat a retreat on the second at the latest.

Such food only should be taken as can be prepared without much water,—that is, bacon, canned beans, flour, and pemmican made preferably of cornmeal, and meat thoroughly cooked and cased in cloth. Coffee, of course, should be provided if it is craved, and sugar for syrup.

If the trip is to be above timber, an oil-stove of galvanized iron is the cheapest practicable means of cooking. If, however,

dry wood can be obtained, it will be far better to take a "Pearl" oil-can in which to build the fire on the snow.

Automobile goggles and knit face-masks are an absolute necessity, and canvas clothing is highly desirable.

With such an equipment we found it possible to be absent ten days from a base of supplies.

Still greater lightness can probably be obtained by improvements in stove, sleeping-bag, and tent. A second pair of felt boots and sufficient food should always be insisted upon, but if either must be slighted, the feet should be given preference to the stomach, for the failure of the former will bring irreparable disaster. In case the weather should become extremely cold, place the sleeping-bag in a hole in the snow and cover it over with the same material, but deep enough so that it cannot be shaken off. With such a blanket of snow, a temperature of $-25°$ F. could readily be met, for according to our tests the thermometer never fell appreciably below $+30°$ F. when buried in the snow.

If the Sierra Club could establish cabins with fireplaces and supplies along King's River, its members could revel in the sports of winter mountaineering from one end of the cañon to the other, and views of winter scenery obtained that would delight the artist's heart.

J. E. Church, Jr.

Reno, Nev., May 20, 1905.

BOOK REVIEWS.

EDITED BY WILLIAM FREDERIC BADÈ.

"CHECK-LIST OF CALIFORNIA BIRDS."

An organization that is doing valuable work on the Pacific Coast is the Cooper Ornithological Club. Its leading spirit is Joseph Grinnell. It would be hard to find any one in California who has a more intimate or a more accurate knowledge of its avifauna. This *Check-List of California Birds** makes no claim to be exhaustive, but it is safe to say that important omissions are few. No description of species is attempted, but the range and principal places of occurrence are given. To the Sierran already familiar with the various species of birds this list will prove useful for reference and for the purpose of keeping count. A shorter list of birds of the Sierras, prepared by the late Chester Barlow, is also among the publications of the Cooper Ornithological Club, and may still be obtainable.

The distribution of animals and plants is governed chiefly by the two factors of temperature and humidity. To make clear this principle in its application to the California avifauna the author has added two maps of the State, the one presenting the four principal life-zones on the basis of isothermic areas, the other giving the faunal areas on the basis of isohumic areas.

The check-list is an excellent piece of work, and reflects credit on the author as well as the club whose membership has helped to gather and verify the information. W. F. B.

"PLANS FOR OBTAINING SUBTERRANEAN TEMPERATURES."

We are indebted to the author, Professor Grove Karl Gilbert, for a copy of this interesting monograph, reprinted from Year Book No. 3, Carnegie Institute of Washington. It fully covers reasons for the desirability of the information sought, and outlines plans proposed for the investigations, and progress made. E. T. P.

* *Pacific Coast Avifauna*, No. 3: Check-List of California Birds. By JOSEPH GRINNELL. Published by the Cooper Ornithological Club. Price, 75c. Address the author at Pasadena, California.

"REPORT OF THE PHILIPPINE CENSUS."

The Sierra Club's library has received from the Bureau of Insular Affairs of the War Department the four volumes of the *Report of the Philippine Census*. This is the first census ever taken of the Philippine Islands. The date of its publication, March 27, 1905, is of great importance to those islands and to this country. The Act of Congress of 1902 provided for the taking of this census; and further provided that after its completion, in case general and complete peace with recognition of the authority of the United States shall continue throughout those of the Islands not inhabited by Moros for a period of two years, then a legislative assembly shall be elected by popular vote. From March 27, 1905, commences this period of two years.

The edition of this report is limited, and the library is fortunate in having been presented with this copy. E. Mc.A.

"YOSEMITE LEGENDS."

The casual visitor to the foot of Yosemite Falls can read the sign-board "Trail of the Lost Arrow," and possibly may wonder at the touch of romance in the name. The name has in fact a romantic origin, as this is the locality of the legend of Hum-moo, the Lost Arrow. And throughout the valley there are many places about which the Indians have a tale to tell. In this book, *Yosemite Legends*,* the author has narrated the principal ones. And in the telling of them, she has clothed them in an atmosphere and a charm that enhance their value, especially to those who can find further enjoyment in Yosemite Valley when they know something of the past tragedies (these present legends) in the lives of the races who for ages have known this place as their only world. E. McA.

"OUT WEST," MAY, 1905.

It is pleasant to find that the outings of the Sierra Club are of sufficient importance to the public at large to call for special reference in other publications than our own. The May issue, called the "Mountaineering Number," of *Out West* contains three such articles by members of the Sierra Club. Mr. Willoughby Rodman has written of "An Outing with the Sierra Club," and has described more particularly the outing of 1904; Miss Marion Randall has an article on "Social Phases of Sierra Club Mountaineering," and Mr. Edward T. Parsons contributes "A Sierra Club Fisherman."

Yosemite Legends. By BERTHA H. SMITH. With drawings by FLORENCE LUNDBORG. 64 pages. Paul Elder and Company, Tomoyé Press. 1904. San Francisco.

The illustrations alone would attract attention. A careful selection seems to have been made from the best of Mr. Parsons', together with three of Professor Badè's.

Each article appeals to a different temperament, and all will interest and entertain the members of the Sierra Club, and particularly those who desire to revive the memories of last year's Outing.

Miss Randall's article is apparently a rewriting of the one that was contributed to the January BULLETIN; but the latter is somewhat more intimate. Her picture of life in the mountains is most encouraging, although "one is fifty miles from a railroad or post-office and a five days' journey from a bathtub," and those who have experienced the pleasures of an outing realize how they are found in the scene described: "From many a widespread meadow, rimmed about with shadowy pines, have we watched the slow impalpable change from garish day to twilight, from dusk to moon-lit night, until the tranquil stars shone forth again to quiet the restless longing the vanishing day brings." And having experienced such moments, we agree with Mr. Rodman: "To many the greatest benefit derived from these outings is the mental and spiritual elevation which comes from communion with nature."

E. McA.

"A GUIDE TO THE STUDY OF FISHES."

A magnificent work in two volumes, just published, entitled *A Guide to the Study of Fishes*,* by David Starr Jordan, has been presented to the Club's library by Henry Holt & Company. Unfortunately it arrived too late for this issue, but will be reviewed in the next January number.

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* *A Guide to the Study of Fishes.* By DAVID STARR JORDAN. With colored frontispieces and 427 illustrations. 2 vols., pp. xxvi, 624, and xxii, 598. Published by Henry Holt & Company. New York. 1905.

FORESTRY NOTES.

EDITED BY PROFESSOR WILLIAM R. DUDLEY.

Two things mark the year 1905 as the most important for California, in the whole history of forestry, with the possible exception of 1891, the year of the passage of the Forest Reserve Law. These two events are, first, the vote of Congress transferring the entire forest reserves of the United States from the official control of the General Land Office to that of the Department of Agriculture and its forestry service, and, second, the enactment of a California Forestry Law by the State Legislature.

THE CALIFORNIA FORESTRY LAW. The passage of this law is of far greater importance to the Pacific Coast than has been acknowledged. It is not an ideal law; its resources were cut down somewhat from the original provisions, disappointing its framers thereby; not all interests are satisfied, and claims are made that sections 16 and 17 will work some hardships in lumbering operations. Nevertheless, the acknowledgment by the greatest State west of the great plains that its forestry interests are so great as to need a code of laws, its act in appointing an expert forester and a corps of assistants, whose duties are a scientific treatment of the forest and protection of the State lands against fire, are gains which cannot be overestimated. The law will doubtless be modified and improved by subsequent legislation; but all advocates of forestry will be half-hearted who do not loyally stand by this law until it has been thoroughly tested in the hands of the Forester.

It is printed in full in this number of the BULLETIN, and we ask campers particularly to read sections 14, 15, and 16. This law has been drawn with the greatest care, with the advice of lawyers best informed in regard to forest and park management, and of foresters of the greatest experience. It was submitted to members of several societies interested in forestry in California and to practical lumbermen. Among modifications brought about in this way we particularly call attention to the italicized clauses in section 3. Through lack of a law providing for the reception and care of donations of land, the State has heretofore lost fine tracts of timber.

TRANSFER OF FOREST RESERVES.

The "Act providing for the transfer of forest reserves from the Department of the Interior to the Department of Agriculture" became a law February 1, 1905, and contains the following clauses:—

"The Secretary of the Department of Agriculture shall, from and after the passage of this act, execute or cause to be executed all laws affecting public lands heretofore or hereafter reserved under the provisions of section twenty-four of the act entitled 'An act to repeal the timber-culture laws and for other purposes,' approved March third, eighteen hundred and ninety-one, and acts supplemental to and amendatory thereof, after such lands have been so reserved, excepting such laws as affect the surveying, prospecting, locating, appropriating, entering, relinquishing, reconveying, certifying, or patenting of any such lands."

"All money received from the sale of any products or the use of any land or resources of said forest reserves shall be covered into the treasury of the United States, and for a period of five years from the passage of this act shall constitute a special fund, available, until expended, as the Secretary of Agriculture may direct, for the protection, administration, improvement, and extension of Federal forest reserves."

In a letter dated February 1, 1905, from the Secretary of Agriculture to the United States Forester, Gifford Pinchot, he indicates the future policy regarding the administration of the reserves. He says:—

"It must be clearly borne in mind that all land is to be devoted to its most productive use for the permanent good of the whole people, and not for the temporary benefit of individuals or companies. All the resources of the forest are for *use*, under such restrictions only as will insure the permanence of these resources. The permanence of the reserves is indispensable to continued prosperity in the great industries of the Western States, and the policy of this department for their protection and use will invariably be guided by this fact, always bearing in mind that the *conservative use* of these resources in no way conflicts with their permanent value. You will see to it that the water, wood, and forage of the reserves are conserved and wisely used for the benefit of the home-builder first of all, upon whom depends the best permanent use of lands and resources alike. The continued prosperity of the agricultural, lumbering, mining, and livestock interests is directly dependent upon a permanent and accessible supply of water, wood, and forage, as well as upon the present and future use of these resources under business-like regulations, enforced with promptness, effectiveness, and common-sense. In the management of each reserve local questions will be decided upon local grounds; the dominant industry will be considered first, but with as little restriction to minor industries as may be possible, and where conflicting interests must be reconciled the question will always be decided from the standpoint of the greatest good of the greatest number in the long run. These general principles can be successfully applied only

when the administration of each reserve is left very largely in the hands of the local officers, under the eye of thoroughly trained and competent inspectors."

These are words of the highest wisdom; use of the reserves without injury to the forests, first to the home-builder, and second to the local industries, always modified by local conditions and local needs. As citizens, men of science, or sentimentalists, we could wish for no better articles of belief. For this transfer of our forests to the trained hands in the Forestry Bureau, we have labored more persistently than for any other end, believing that all the vexed questions which come before the laymen in forestry in the West can only be settled through the dominion of the trained forester over his proper domain, the forests; the above words of promise from the Secretary of Agriculture justify all efforts made to effect this change. It is also ruled that "*Forest Service* is the new official title of the organization having immediate charge of all National forest work under the Secretary of Agriculture. It replaces the Bureau of Forestry in the Department of Agriculture and the Division of Forestry in the General Land Office."

The members of the Sierra Club who can look back to our meeting at the California Academy of Sciences, less than ten years ago, held to arouse public thought upon the condition of our forests at a time when interest in them was at its lowest ebb, can best realize how greatly the public has been educated during this period in a knowledge of forestry problems, and how rapidly a statesman-like policy can advance under the leadership of a few capable men. The time was ripe and the leaders came in the persons of Roosevelt, Pinchot, and Wilson, all of one mind, and of the right mind. The transfer of the reserves has not been heralded with great headlines in the newspapers, but it will so affect business methods in connection with interests so vast in extent and so vital to our well-being as a nation that the historian of a century hence will reckon it as the beginning of one of the most important influences in our national life.

THE LIEU LAND LAW. The last Congress also repealed the law allowing owners of land inside of forest reserves to select equal areas of non-mineral-bearing land elsewhere. This law was the cover to great frauds, because it allowed speculators of the Benson-Hyde type to buy up tracts, often nearly worthless cut-over or brush-lands, inside forest reserves, at a low figure, and locate equal amounts in the most valuable timberlands of the public domain. This law was not wholly baneful,

however; considerable tracts of land containing *Sequoia gigantea* in Tulare County, California, passed back to the Government through its operations.

THE YOSEMITE. The boundaries of the Yosemite National Park were modified by the last Congress so as to throw a considerable acreage, most of little forest value, into the Sierra Forest Reserve. This is understood to follow the general lines of the recommendations of the expert commission appointed by President Roosevelt to report on the case, and therefore is unobjectionable.

The so-called "recession" of the Yosemite Valley to its real owner, the United States, was accomplished by a legislative bill passing both houses of the California Legislature, after a vigorous campaign, supported by the best interests and most rational thought in the State. The Sierra Club had much to do in bringing about the desired results under the active and efficient leadership of its secretary. The act simply terminated a trust on behalf of the State, and returns to the wardship of the Nation, where it will be better cared for, the finest piece of natural scenery in the State, and yet it will be freer, after a few years, to the citizens of the State than ever before.

I. Russell
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PUBLICATIONS OF THE SIERRA CLUB

Number 33

SIERRA CLUB BULLETIN

Vol. V No. 4

JUNE, 1905

SAN FRANCISCO, CAL.

1905

SIERRA CLUB BULLETIN

JUNE, 1905

Vol. V. No. 4

CONTENTS:

PAGE

THE GRADE PROFILE IN ALPINE GLACIAL EROSION . . . . . *Willard D. Johnson* . 271
Plates XXXVI, XXXVII, XXXVIII, XXXIX.

SYSTEMATIC ASYMMETRY OF CREST-LINES IN THE HIGH SIERRA OF CALIFORNIA . . . . . *G. K. Gilbert* 279
Plates XL, XLI, XLII, XLIII.

THE TUOLUMNE CAÑON . . . . . *Wm. Frederic Badè*. 287
Plates XLIV, XLV.

INSCRIPTION FOR THE LECONTE MEMORIAL . . . . . *Harriet Monroe*. . . 296

OVER HARRISON'S PASS FROM THE NORTH WITH A PACK-TRAIN . . . *Force Parker* 297
Plates XLVI, XLVII.

CALIFORNIA FORESTRY LAW (1905) 303

ORGANIZATION OF SIERRA CLUB 310

REPORTS:
Report of the Secretary 311
Report of the Treasurer 313

NOTES AND CORRESPONDENCE 314

BOOK REVIEWS . . . . . *Wm. Frederic Badè*. 322

FORESTRY NOTES . . . . . *William R. Dudley* . 325

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